#15 $y = e^{ax}\sin x$, a값 구하기

$y'' - 2y' + 2y = 0.$

$y' = ae^{ax}\sin x + e^{ax}\cos x = e^{ax}(a\sin x + \cos x)$

$y'' = a^2e^{ax}\sin x + ae^{ax}\cos x + ae^{ax}\cos x + e^{ax}(-\sin x) = e^{ax}(a^2\sin x - \sin x + 2a\cos x)$

$\boxed{e^{ax}}(a^2\sin x - \sin x + \cancel{2a\cos x}) - 2\boxed{e^{ax}}(a\sin x + \cancel{\cos x}) + 2\boxed{e^{ax}}\sin x = 0$

$\Rightarrow e^{ax} \neq 0 \Rightarrow a^2\sin x - \sin x - 2a\sin x + 2\sin x = 0.$

$\Rightarrow (a^2 - 2a + 1)\sin x = 0, \ \forall x \in \mathbb{R}$

$\Rightarrow a^2 - 2a + 1 = (a-1)^2 = 0$

$\therefore a = 1.$